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Speech Language Pathologists and Prosody: Knowledge and Clinical Practices

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by
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ABSTRACT

SARAH ELIZABETH FISCHER: SLPs and Prosody: Knowledge and Clinical Practices
(Under the direction of Kara Hawthorne)

Prosody is an important aspect of language as it signals linguistic contrasts, conveys pragmatic distinctions, and expresses emotional affect. However, prosody is impaired in several populations, and such impairments can negatively affect intelligibility and the social perception of the speaker. Speech Language Pathologists (SLPs) are the professionals responsible for treating such impairments, yet the knowledge base of SLPs regarding prosody is unknown. The purpose of this study is to evaluate SLPs' knowledge of assessing, treating, and diagnosing prosodic impairments by using a survey (n=269). While a majority of SLPs surveyed agreed that prosody is within their scope of practice, they also reported that their knowledge and clinical training on assessing, diagnosing, and treating prosodic impairments is not adequate. Overall, SLPs feel they are lacking in knowledge of assessment and treatment methods, experience with clients with prosodic impairments, and knowledge of the nature of prosody. By dedicating more coursework and CEUs to prosody, providing an easy-to-administer assessment, and encouraging SLPs in their efforts in working with such impairments, SLPs will feel more competent in working with clients with prosodic impairments.

Keywords: Prosody, Speech-Language Pathologist, Clinical Practice

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LIST OF ABBREVIATIONS

ASHA	American Speech-Language Hearing Association
ASD	Autism Spectrum Disorders
DANVA	Diagnostic Analysis of Nonverbal Accuracy
DAS	Developmental Apraxia of Speech
PEPS-C	Profiling Elements of Prosody in Speech-Communication
PVSP	Prosody-Voice Screening Profile
SLP	Speech Language Pathologist

1. Introduction

Prosody, the melody and rhythm of speech, is an important aspect of language because it provides speakers with a way to signal linguistic contrasts (Cruttenden, 1997), make pragmatic distinctions (Peppé, 2009), and express emotion (Berckmoes & Vingerhoets, 2004). Prosody is impaired in many populations including those with diagnoses of Autism Spectrum Disorder (Shriberg et al., 2001), Williams syndrome (Stojanovik, Setter, & van Ewijk, 2007), and Down syndrome (Stojanovik, 2011). Prosody has been found to play a significant role in intelligibility (Field, 2005), and prosodic skills are even related to later literacy abilities (Miller & Schwaneflugel, 2008). While prosody is essential in successful communication, Kalathottukaren, Purdy, and Ballard (2015) suggest that prosodic assessment, diagnosis, and treatment may be neglected due to a lack of training or awareness. The present study aimed to evaluate Speech Language Pathologist's (SLP) knowledge of assessing, diagnosing, and treating prosodic impairments to better inform clinical training and practice.

1.A. Prosody's role in spoken language

Prosody is acoustically manifested as differences in fundamental frequency (the acoustic correlate of pitch), duration, and intensity (the acoustic correlate of loudness). Speakers manipulate these three dimensions for many functions: (1) signaling linguistic contrasts, (2) conveying pragmatic distinctions, and (3) conveying emotional affect.

Linguistic contrasts conveyed through prosody include lexical stress, phrasal prominence, and syntactic chunking. Lexical stress is word-level prominence that occurs on certain syllables within each content word (nouns, verbs, adjectives, and adverbs). In English, it is primarily marked with increased syllable duration and secondarily with higher pitch accent and increased intensity (Shattuck-Hufnagel & Turk, 1996). For example, *REcord* (the noun) has stress on the initial syllable, while *reCORD* (the verb) is produced with stress on the second syllable. Stress can also be observed at the sentence level. A lexically-stressed syllable will typically carry phrasal prominence as well, which can impact the meaning of an entire utterance. For example, *Kara likes CATS* could imply Kara may not like dogs very much, while *KARA likes cats* could suggest Susan may not be so fond of cats. Speakers also use prosody in spoken language in a similar way that writers will use punctuation in written language – to provide information about the syntactic chunking. For example, in *I want fruit, salad, and cheese*, *fruit* is lengthened compared to *I want fruit-salad and cheese* (Shattuck-Hufnagel & Turk, 1996), therefore by perceiving the lengthened *fruit*, the listener is able to infer the speakers message.

The pragmatic functions of prosody can also be used to signal turn-taking in conversation. At the end of a declarative utterance, fundamental frequency and intensity are lowered, and the syllable is lengthened to convey to the listener both the utterance and conversational utterance is ending (Vaissière, 1983). Furthermore, prosody can convey the speaker's intentions (Peppé, 2009). For example, the speaker can alter their prosodic features to say *I looooooove salad* sarcastically. The prosodic cues allow the listener to perceive the sarcasm, and in turn respond according to the speaker's intended message.

Finally, prosody is used to express emotional affect. Emotional states are able to be characterized by acoustic profiles (Hammerschmidt & Jurgens, 2006). For example, sadness is characterized by a slower rate and a lower pitch. Happiness is characterized by an increased rate and higher pitch. Prosody can also be used to convey the strength of an emotion. For example, *I LOVE salad* conveys stronger emotion than *I love salad* because of the heightened pitch, extended duration of the syllable, and higher intensity.

1.B. Prosodic impairments

Prosodic impairments have been observed and investigated in populations who commonly have other atypical features to their speech and language, including individuals with Autism Spectrum Disorder (ASD), Down syndrome, William's syndrome, developmental apraxia of speech (DAS), and dysarthria, as well as individuals who are deaf or hard of hearing. The relationship between prosodic performance and other cognitive and linguistic skills is unclear, but it is possible the severity of symptoms from the person's diagnosis impacts the magnitude of atypical prosody. Paul et al. (2005) found that prosodic skills are not related to verbal IQ. Further, McCann, Peppé, Gibbon, O'Hare, and Rutherford (2007) suggest prosodic skills may be more correlated with receptive language ability than age and independent of non-verbal ability. It is also important to note that deficits in different domains of prosody are independent of each other (Paul, Shriberg, et al., 2005). While general trends have been observed, researchers have nevertheless tried to create prosodic profiles of specific groups.

One population whose prosodic impairments have been heavily investigated are individuals with ASD: stress, emotional affect, and pitch differences are commonly noted

in the literature. Within this population, prosodic abilities vary greatly (Peppé, McCann, Gibbon, O'Hare, & Rutherford, 2007), but most individuals show significant difficulties in one or more areas (McCann et al., 2007). According to Paul, Augustyn, Klin, and Volkmar (2005), both stress production and perception are areas of difficulty for individuals with ASD. In addition, emotional affect is found to be a relative weakness in the prosodic profile of individuals with ASD (Peppé et al., 2007). On the other hand, Grossman, Bemis, Skwerer, and Tager-Flusberg (2010) found that individuals with ASD were able to use prosodic cues at the sentence-level in isolation to determine simple emotions of the speaker. Finally, children with ASD, particularly with a lower IQ, display greater pitch ranges, perceived as "sing-song" speech, in comparison to their peers (Nadig & Shaw, 2012). However, opposed to the widespread stereotype, Nadig and Shaw (2012) found no evidence of monotone intonation patterns.

Individuals with intellectual and/or developmental disabilities also frequently have prosody impairments. For example, Stojanovik (2011) evaluated the prosodic profiles of children with Down syndrome and found that the production and comprehension of was notably impaired compared to a mental age comparison group. Children with Down syndrome showed better prosodic comprehension than production and had noticeable differences in abilities to discriminate and imitate intonation patterns (Stojanovik, 2011). Stojanovik, Setter, and van Ewijk (2007) found that intonation abilities and language in William's syndrome do not support each other in the same way as in typically developing peers, however intonational abilities are appropriate for their receptive language skills. In general, persons with William's syndrome have mild

difficulty decoding prosodic information, especially when accompanied by linguistic content (Skwerer, Scholfield, Verbalis, Faja, & Tager-Flusberg, 2007).

The previous disorders all come with broader language impairments, but prosody is also impaired in those who have difficulties related to speech. In Developmental Apraxia of Speech (DAS), dysprosody is a primary feature (Ballard, Robin, McCabe, & McDonald, 2010) and especially in lexical or phrasal stress (American Speech-Language-Hearing Association, 2007). Shriberg, Green, Campbell, McSweeny, and Scheer (2003) discovered children with DAS had increased pause durations and decreased variation in the duration of speech in comparison to control groups. Individuals with dysarthria also display prosodic impairments including reduced duration of tone units and smaller deviations in fundamental frequency (Bunton, Kent, & Kent, 2000). Moreover, the American Speech-Language Hearing Association (ASHA) notes individuals with dysarthria may have speak more quickly or slowly, speak softly, and even may sound robotic (ASHA, n.d.).

Individuals that have hearing loss also develop prosodic differences. Despite early intervention and speech services, children with hearing loss performed worse on prosody assessments in comparison to their age and gender matched peers suggesting subtle variations of acoustic cues are difficult to detect (Kalathottukaren, Purdy, & Ballard 2017). However, Lenden and Flipsen (2007) note that prosodic characteristics of children with hearing loss are less of an issue than they were in the past. They found that their sample of children with severe to profound hearing loss who were fitted with cochlear implants only consistently had problems with resonance quality and stress.

Overall, it is clear that prosody is impaired in many populations that SLPs serve, but it is unknown the extent that prosody is addressed in speech therapy. Prosodic impairments negatively impact social perceptions and impaired intelligibility, which is even noticed in differences of speakers with a foreign accent (Kang, Rubin, & Pickering, 2010). Therefore, it is important that prosody be addressed alongside other language and communication therapies (Nadig & Shaw, 2012).

1.C. Clinical Practice

Despite the prevalence of prosodic impairments, Diehl and Paul argued in 2009 that current methods of prosodic assessment are decades behind assessments used for other aspects of speech and language. Almost decade after that study, the statement still holds true and it is just as important to have a comprehensive prosodic assessment that is normed, empirically based, valid, sensitive to developmental changes, and clinically relevant. Current batteries are not normed to all populations or only focus on a specific aspect of prosody, such as affect or pragmatics. In addition, McSweeny and Shriberg (2001) note that skills for prosodic assessment are not usually taught during academic training of SLPs. Not only must adequate tests be available, the SLP must also have sufficient knowledge of the assessment methods to ensure successful diagnostics (Kalathottukaren et al., 2015).

The Profiling Elements of Prosody in Speech-Communication (PEPS-C; Peppé & McCann, 2003) is perhaps the best known an assessment of prosody. The tasks within the PEPS-C assess expressive and receptive prosody at form and function levels. It examines many domains of prosody and takes about 45 minutes with typically developing children.

The PEPS-C assessment was evaluated by Gibbon and Smyth (2013) who concluded the test could be a valuable battery for assessing prosody in younger, typically developing populations and in some populations with developmental and/or intellectual disabilities of similar mental age. However, only 83% of their young respondents were able to complete the test. When assessing younger individuals or those with an intellectual or developmental disability the duration of the test may be longer and in a clinical setting when other language impairments also exist, a quick assessment is needed. Therefore, the PEPS-C is not always satisfactory for clinician's needs.

Another standardized assessment of prosody is the Prosody-Voice Screening Profile (PVSP) (McSweeny & Shirberg, 2001). After a speech sample is taken, the tester codes each section and a pass-fail profile of prosody and voice suprasegmental aspects targeted is created. There are limitations of the PVSP discussed in the literature, such as efficiency in the coding processes and the importance of an acoustically-based assessment procedure to fully study the clinically relevant aspects of prosody (McSweeny & Shirberg, 2001). Finally, two other assessments of prosody focus only on the affective processes: The Aprosodia Battery (Ross & Monnot, 2011) and The Diagnostic Analysis of Nonverbal Accuracy (DANVA) (Nowicki & Duke, 1994). Both assessments are useful for assessing emotional affect, however for clinical use they are unfitting unless emotional affect is the only concern for assessment. Additionally, it is unknown the extent to which they are used.

Hargrove, Anderson, and Jones (2009) reviewed prosodic intervention strategies. While the number of studies meeting selection criterion was limited (n=14), the literature shows that prosody can be shaped using behavioral interventions. Independent of the

studies used in the review, other research suggests that meta-linguistic activities are appropriate for prosodic treatment (Paul et al., 2005). Peppé (2007) suggests that targeting receptive skills could be useful in improving expressive prosodic skills and Wang and Tsao (2105) additionally suggest improving perception abilities can reduce a person's social communication difficulties. Exercises to augment an individual's sensitivity to prosodic cues by over-emphasis can help draw simultaneous attention to the linguistic and paralinguistic messages of an utterance (Jarvinen-Pasley, Peppe, King-Smith, & Heaton, 2008). Nevertheless, it is unknown if these strategies are employed in clinical practice.

1.D. Present Study

Prosody is an important aspect of speech and language because it signals linguistic and pragmatic contrasts and conveys emotion. Individuals with prosodic impairments can struggle to understand or produce these contrasts or to appropriately identify or express emotions. These prosodic deficits can adversely impact how the speaker is perceived in a social setting (Shriberg & Paul, 2001) and even make an individual's speech less intelligible (Kang, 2010). According to ASHA, SLPs are professionals responsible for assessing, diagnosing, and treating such impairments (ASHA, 2016), yet it is unknown how much training SLPs receive on prosody and the extent to which they address it clinically. This study set out to evaluate SLPs' training and knowledge of assessing, diagnosing, and treating prosodic impairments. It is hypothesized that SLPs have minimal knowledge and training on prosody compared to other aspects of language and do not target prosody often. In addition, it is hypothesized

that SLPs can identify atypical prosody, but do not often target it due to the perceived relative importance of prosody versus other speech and language needs.

2. Methods

2.A. Design

This study utilized a non-experimental, descriptive design. The survey, along with IRB verification, was sent out in conjunction with an associated survey on SLPs knowledge and clinical practices of literacy (Loveall & Gibson, 2017). The overall survey, crafted using Qualtrics, consisted of three blocks: participant characteristics, prosody, and literacy. The participant characteristics section was presented first followed by the literacy and prosody sections in random order. The participant characteristics section (Appendix B) included questions about gender and race, licensure, work settings and caseloads, and familiarity with specific populations. The prosody section (Appendix C) targeted respondents' knowledge of prosody and its importance, their training in prosody and prosodic impairments, and assessment practices and treatment of impaired prosody.

Eight Communication Sciences and Disorders students (graduate and undergraduate) and one SLP-CCC reviewed the survey before it was disseminated to respondents. Feedback from reviewers was used to aid with survey clarity, organization, and content, as well as to determine an estimated duration for responding to the survey. The final version included twelve questions on participant characteristics and 17 on prosody.

2.B. Respondents and Procedures

Respondents were recruited through the 2016 Fall Institute in CSD at the University of Mississippi and through the speech-language hearing association for each state in the United States. The survey, along with IRB verification, was sent via email as a Qualtrics link in 5 groups of 10 states with a request that they circulate the survey to their members via listserv. After one week, a reminder email was sent to each state representative, but it is unknown if the representatives posted or emailed the reminder. It was estimated that they survey would take 15 to 20 minutes of the participant's time. The survey could remain open on a web browser for however long the participant needed to complete. At the end of the survey, a link to alternative survey was provided to enter for the chance to win an Amazon gift card. The additional form was not connected so data would remain anonymous. The first page of the survey (Appendix A) reviewed with respondents the task at hand and continuing ensured consent. Mississippi respondents were recruited in two ways: attendees of the Mississippi Fall Institute and members of the state organization.

2.C. Measure/Materials

Because the survey is non-experimental, responses to the questions were measured as outcome variables. The survey included the following question styles to obtain different aspects of SLPs knowledge in relation to prosody: Likert-style statements, multiple selection, and open-ended or fill in the blank questions. In reported data, agreement will be considered responses "strongly agree," "agree," and "somewhat agree," disagreement will be considered responses "strongly disagree," "disagree," and

"somewhat disagree," and neither agree nor disagree will be reported as is. Each question had a different number of respondents, so percentages are reported based off the number of responses for that question.

3. Results

3.A. Participant Demographics

The 269 respondents included in the final sample had a Certificate of Clinical Competence in Speech-Language pathology and answered at least one question regarding prosody. Of the respondents, 95.9% (n=258) reported being female; 95.1% (n=255) reported being Caucasian, 2.6% (n=7) reported being Black or African American, 0.07% (n=2) reported being Asian, and 1.1% (n=3) preferred not to answer.

Respondents obtained their highest degree in a variety of states (n=34), but majority from Illinois (18.4%, n=49), Kansas (12.0%, n=32), Mississippi (22.5%, n=60), Missouri (9.4%, n=25), and North Dakota (4.1%, n=11). Fewer than ten respondents obtained their degrees from the remaining states. Two hundred and fifty respondents obtained their Master's degree from 1968 to 2016 (1968-1980, n=23, 1981-1990, n=60, 1991-2000, n=65, 2001-2005, n=20, 2006-2010, n=33, 2011-2016, n=50). Additionally, 17 respondents report a Doctorate (Ph.D. or Ed.D.) as their highest level of education, which was earned between the years 1977 to 2015 (1977-2000, n=4; 2001-2015, n=13). Most commonly, respondents work in elementary schools, preschools, and middle school/junior high (Table 1).

Setting	n	%
Early Invention	37	13.8%
Preschool	86	32.0%
Elementary School	147	54.6%
Middle School/Junior High	79	29.4%
High School	56	20.8%
University	29	10.8%
Private Practice	20	7.4%
Hospital	20	7.4%
Nursing Facility	19	7.1%
Other, e.g., home health, teletherapy, outpatient	24	8.9%

Table 1. Respondent work settings. Note that respondents were able to select more than one option. Total number of respondents was 269, while 517 total responses were obtained. Percentage for this question derived from number of respondents.

On average, respondents report 44.5 clients (SD = 26.7; range = 2-240) on their caseload each month. Excluding four outlying respondents who reported caseloads of more than 100, the average is 42.2 clients (SD = 18.6; range = 2-92). With these caseloads, respondents have experience with a variety of populations that could display prosodic impairments (Figure 1).

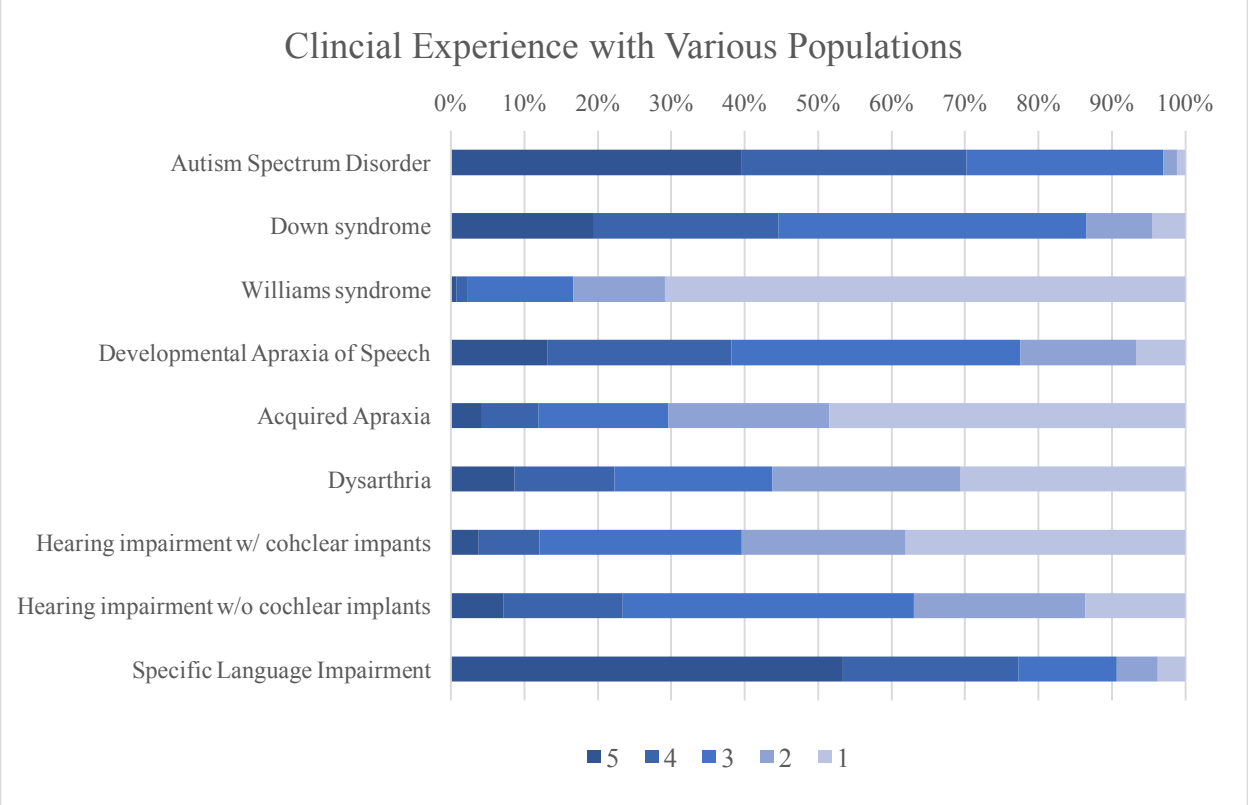

Figure 1. Clinical Experience with various populations. Number of responses for questions ranged from 260 (Acquired Apraxia) to 268 (ASD, Specific Language Impairment). 5 = A lot of experience; 3 = Some experience, 1 = No experience

3.A. Impact of Disorders Prosody

While 88.6% of SLP of agree that prosody is in their scope of practice, 67.0% also agree it a low priority when looking at a client's speech and language needs as a whole. Further, respondents in general report that prosodic impairments can affect the client's intelligibility, the client's ability to express themselves, and social perceptions of the client (Table 2).

Statement	n	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Assessing and treating prosodic impairments is part of the scope of practice of an SLP.	220	27.7%	49.5%	11.4%	9.5%	0.5%	0.5%	0.9%
Prosody is usually a low priority when considering a client's speech and language needs as a whole.	222	5.0%	31.1%	31.1%	18.9%	7.7%	6.3%	0.0%
Prosodic impairments impact a client's intelligibility.	220	14.1%	40.5%	28.2%	9.5%	3.6%	2.7%	1.4%
Prosodic impairments impact a client's ability to express themselves.	221	17.2%	38.5%	29.0%	11.8%	1.4%	1.8%	0.5%
Prosodic impairments impact other people's social perceptions of the client.	221	29.4%	44.8%	19.9%	5.4%	0.5%	0.0%	0.0%

Table 2. Agreement/disagreement of prosody's importance and impacts. Numbers may not add up to 100% because of rounding.

SLPs were asked to identify the impact of a prosodic difference amongst different populations (Figure 2). Prosodic impairments are least noticed in Specific Language Impairment and most commonly noted in ASD, DAS, and dysarthria.

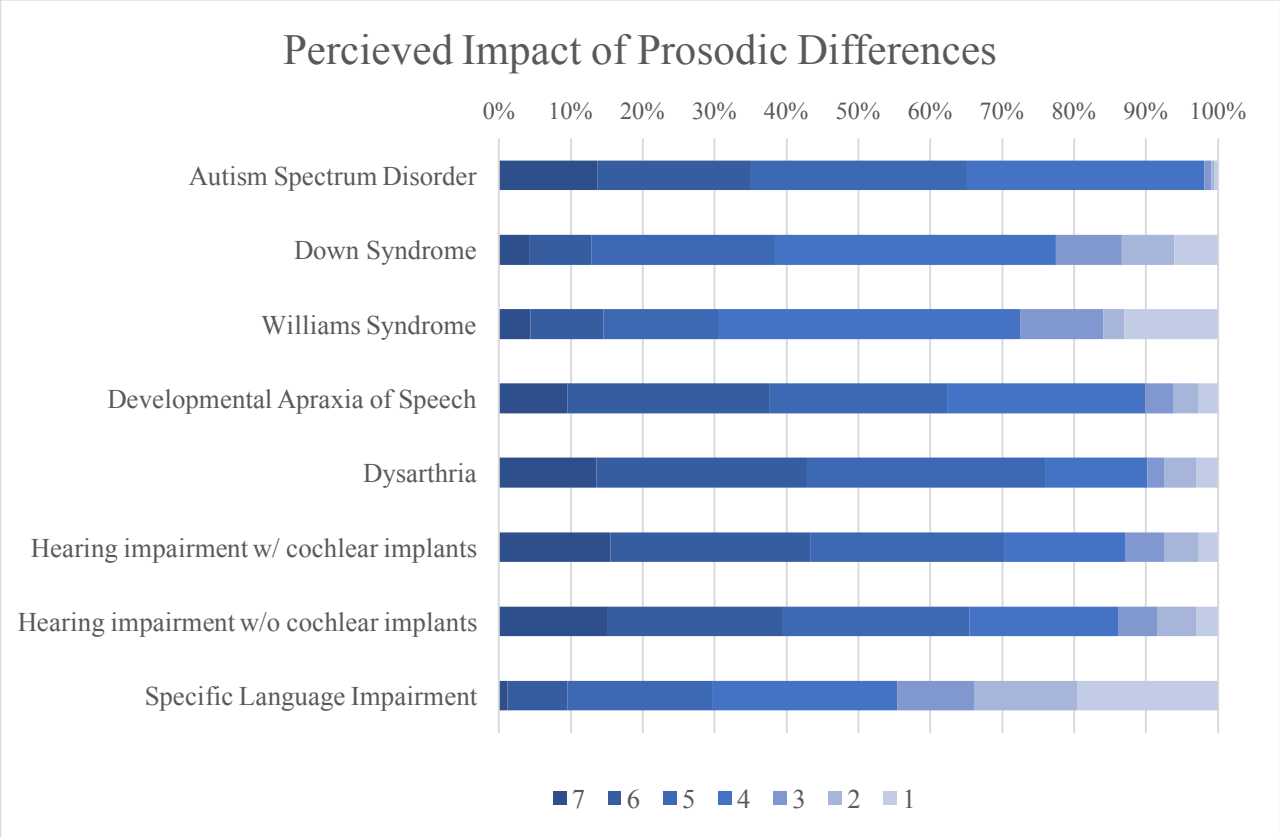

Figure 2. Perceived Impact of Prosodic Differences. Number of responses for questions ranged from 69 (Williams Syndrome) – 212 (ASD). 7 = Prosody is impaired and is of primary concern; 4 = Prosody is impaired, but is not of primary concern; 1 = Does not significantly impact prosody

Of prosodic differences are noticed by SLPs, and the most commonly noted prosodic impairments include appropriate pitch and loudness and conveying emotion (Table 3).

Prosodic Skill	N	%
Conveying emotion through tone of voice	133	67.9%
Producing speech with appropriate pitch variation (e.g., not monotone)	135	68.9%
Producing appropriate question versus statement intonation	91	46.4%
Producing appropriate word-level stress	102	52.0%
Producing appropriate sentence-level stress to convey emphasis or contrast	82	41.8%
Producing speech with appropriate loudness	114	58.2%
Understanding a speaker's emotions from their tone of voice	111	56.6%
Understanding linguistic aspects of prosody	90	45.9%
Understanding other aspects of prosody	43	21.9%
Other (please specify)	5	2.6%

Table 3. Most common prosodic impairments noted by clinicians. Note that respondents were able to select more than one option. Total number of respondents was 196, while 906 total responses were obtained. Percentage derived from number of respondents.

3.B. Background Knowledge/Training

Despite being aware of prosodic impairments, few (26.2%, n=60) SLPs felt that their overall training in prosody was adequate. More specifically, only 18.5% (n=49) felt their training on assessing and diagnosing was adequate, and only 15.9% (n=42) felt their training on treating prosodic impairments was adequate (Table 4). The training that was received occurred through a variety of avenues - most commonly graduate coursework, collaboration with other SLPs, and Continuing Education Units, required education to maintain licensure. However, only 13.4% (n=35) of respondents agreed there are sufficient Continuing Education Units available addressing prosody.

Means of Prosodic Education	N	%
Prosody was addressed in graduate course(s)	178	70.9%
Prosody was a primary focus of at least one graduate course	19	7.6%
Clinical clock hours/clinical practicum experiences during graduate school	49	19.5%
Training in prosody during Clinical Fellowship Year	15	6.0%
Continuing Education Units	88	35.1%
Seminars/webinars/conferences (not for Continuing Education Units)	35	13.9%
Textbooks	81	32.3%
Journal articles	72	28.7%
Collaboration with other SLPs	91	36.3%
Collaboration with researchers or academics	14	5.6%
Experience with clients after receiving CCCs	59	23.5%
Other e.g., undergraduate coursework, self-research	10	4.0%

Table 4. How respondents gained knowledge about prosody. Note that respondents were able to select more than one option. Total number of respondents was 251, while 711 total responses were obtained. Percentage derived from number of respondents.

Despite some education in prosody, SLPs feel there are lacking in many areas that pertain to clinical practice of prosody (Figure 3).

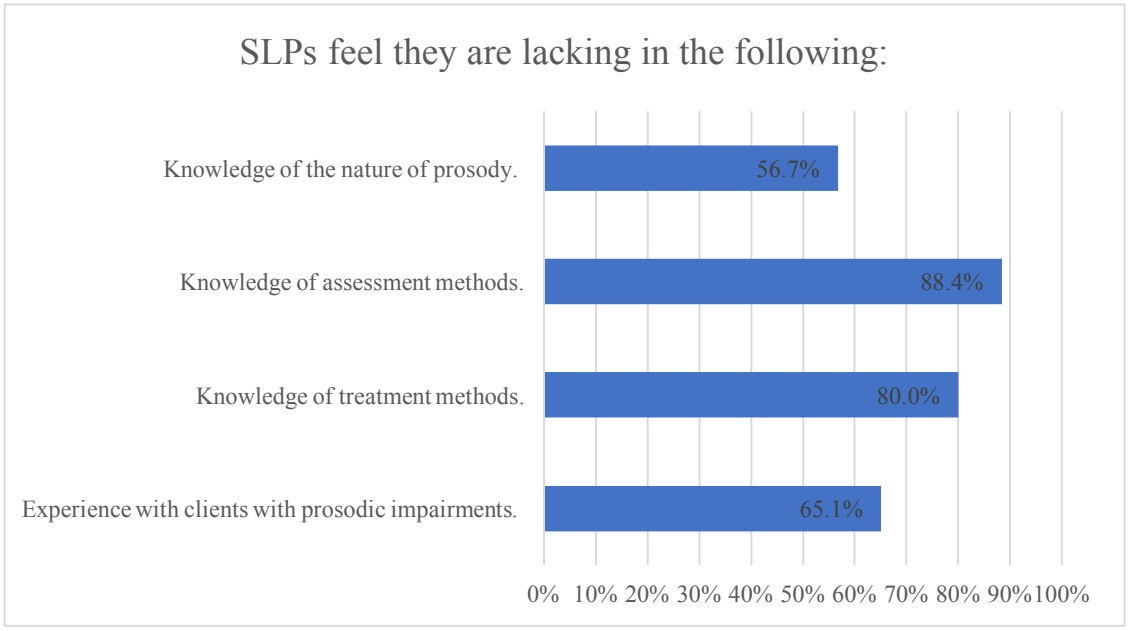

Figure 3. Aspects in which SLPs feel they are lacking. Total number of respondents was 215. Percentage derived from number of respondents.

3.C. Clinical Practice

SLPs do not assess prosody most (63.8%, n=152) of the time when a prosodic disorder is suspected. When assessment is done, the most common method is an informal assessment (72.7%, n=56). Standardized assessments are available, but just 7.8% (n=6) of respondents have administered one, such as the PEPS-C or PVST. However, only 27.2% (n=63) agree that they do not have time to administer a prosody assessment. Table 5 shows respondents opinions on various aspects of prosodic assessment.

Statement	N	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
If there were an easy-to-administer standardized assessment for prosody, I would use it as a part of a comprehensive assessment for some of my clients.	239	10.9%	30.1%	26.4%	19.7%	3.8%	4.6%	4.6%
The prosody assessments that are available are adequate for my needs.	231	0.0%	4.3%	3.9%	68.8%	7.4%	12.1%	3.5%
If a client came to me with a prosodic impairment, I would know how to assess it.	239	2.5%	5.0%	18.8%	17.2%	23.4%	21.3%	11.7%
I am just as comfortable assessing prosody as other aspects of speech, language, or literacy.	240	2.1%	5.4%	9.6%	14.6%	20.0%	27.1%	21.3%

Table 5. Agreement with statements regarding assessment of prosody.

In therapy, prosody is rarely (36.5% n=69) or never targeted (10.6%, n=20). Appendix D shows responses (n=43) to a fill in the blank question focusing on prosodic intervention. Responses were categorized as targeting acoustics (n=14) or prosodic

function (n=21). Additionally, eighteen respondents indicated using techniques such as recordings, visual, or modeling/imitation and four respondents reported using a formal technique such as PROMPT therapy, Prosody Treatment Program (Linguisystems), Ballard, Neufield, and Pragmatic Speech Therapy. Table 6 shows respondents' knowledge and comfort in regards to treating prosodic impairments.

Statement	N	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
If a client came to me with a prosodic impairment, I would know how to treat it.	235	1.7%	9.4%	24.7%	19.1%	20.0%	16.2%	8.9%
I am just as comfortable treating prosody as other aspects of speech, language, or literacy.	240	2.1%	7.5%	10.0%	14.6%	18.8%	25.8%	21.3%

Table 6. Agreement with statements regarding prosodic treatment

4. Discussion

4.A. Impact of Prosody

As outlined in Section 3.A., prosody is impaired in many clinical populations and SLPs were able to notice prosodic impairments in those populations (Figure 2), though there was some variability across disorders. Experience is likely to play a role in the perceived impact of prosody. Almost 100% of respondents noted impaired prosody in ASD, yet only 72.5% of respondents agreed that prosody was impaired in Williams syndrome. It is clear in the literature that both populations have prosodic deficits, so the reason behind SLPs perceptions of disordered prosody can be speculated. The respondents may have been more sensitive to differences in ASD because of the role their experience plays in prosodic knowledge. Respondents had significantly less experience with persons with Williams syndrome compared to those with ASD. It could be that the less experience a person has with a population, the less knowledge they have of their general language profile. Alternatively, the difference could be because prosody is more impaired in ASD than Williams syndrome. Finally, the perceived impact of different prosodic features on intelligibility and accentedness varies from listener to listener, so respondents' perceptions of disordered prosody across populations could be due to differences in stress, pitch range, speaking rate, and pausing (Kang et al., 2010). The perceived impact varies from rater to rater, therefore each person could rate the disordered prosody differently.

Prosodic differences are easily observed by SLPs despite the reports of minimal training. Given previous work suggesting that disordered prosody impairs social perceptions and intelligibility, it is likely that people without training in speech-language pathology are able to notice the differences as well. This adds onto the negative social repercussions of prosodic impairments, because people without training in speech and language may not be as sensitive or comfortable interacting when distinctive prosodic difficulties are present.

4.B. Education

Despite lack of confidence in assessment and treatment, SLPs do report some training in prosody. The knowledge most frequently came from graduate courses, collaboration with other SLPs, or CEUs. However, because the SLPs did not feel their training was sufficient, more coursework and CEUs could to be dedicated to general prosody knowledge and the assessment, diagnosis, and treatment. Curriculum committees could work to integrate more coursework to prosody, so that future SLPs can enter the field with a basis of knowledge that those who graduated earlier do not have. This would craft them into a resource for collaboration with those already practicing. In regards to CEUs, conference chairs could be encouraged to seek out seminars that focus on prosody in clinical practice. If an SLP has a client base with known prosodic impairments, they could seek out this opportunity to learn. Not only would this benefit their client, but it would also fulfill licensure requirements. Even small strides in increasing SLPs' knowledge of prosody can positively impact the client base they serve.

4.C. Assessment/Treatment

Despite the importance of prosody outlined in Section 1.A., most of the time when a SLP suspects a prosodic disorder, they still do not assess it. When a prosody assessment is done, it is usually an informal assessment, which is not ideal because it lacks normative data. Additionally, respondents aren't as comfortable assessing prosody as they are with other aspects of speech and language. Given the limitations of assessment tools (Section 3.C.), the lack of prosody in clinical practice is unsurprising. Poor assessment tools lead low assessment rates, which in turn may lead to a lack of treatment.

Many things could be done to achieve better assessment practices. One suggestion is to update the current assessments so they can be used for more populations. Less than 5% of the respondents agreed that the available assessments are fit for their needs. This could be due to the complexity of the assessments, the time needed to give the assessment, or lack of knowledge of standardized assessments of prosody. A prosody assessment should be crafted that is easy to use, does not take too much time, and is useful for a variety of populations. Surprisingly, the respondents note that time constraints are not an issue when deciding to assess prosody; therefore, it may be more important to have an easy to administer assessment than one that is time friendly. Another suggestion to increase prosodic assessment batteries is to add a prosody section to current popular assessments for general language. It is important for the field to encourage prosodic assessment when a prosodic difference is noticed or suspected, even if it is an informal assessment.

An interesting finding is that SLPs report treating prosody more than they assess it, perhaps due to weaknesses in current assessment tools. However, because informal assessments were the most common way to assess, SLPs may consider noticing a prosodic impairment sufficient to proceed to treatment. Respondents report targeting prosody in a variety of ways (Appendix D), suggesting that there isn't a standard way to target prosody in therapy sessions. One suggestion is for SLPs to work together to create a prosody intervention program. If it is crafted by the practicing SLPs, they can use their experience to make a program that could be successful and useful clinically.

4.D. Limitations

A threat to validity in this study was that SLPs may respond in ways they consider socially desirable. If a participant did not know much about prosody, they could have responded in a way they feel is most acceptable. This limitation was partially combated by ensuring anonymity of the data. A second limitation is unequal representations from the states. However, the states were geographically diverse, so the results are not specific to an area of the United States. Future research can go in many avenues, including evaluating graduate programs' prosody coursework, crafting CEUs that focus on prosody, and researching what increased knowledge does for clinical practices.

4.E. Conclusions

Despite limitations, this study was the first to evaluate SLPs' prosodic knowledge and practices. The biggest step in bringing attention to the importance of prosodic impairments is to encourage and support SLPs in their efforts in working with prosody.

This study shows that SLPs might not be fully trained on this important aspect of speech and language. It is understandable that prosody could be low priority, especially in severe communication disorders when no language exists. However, it is also important to remember how much a prosodic impairment impacts others' social perception of the client, as well as the client's intelligibility and future literacy outcomes. Disordered prosody can also affect an individual's ability to express themselves and understand others' intended messages. Prosody enables a person to express their emotions and disambiguate the language they hear and use in their everyday lives. Even if a person is unable to produce language, the ability to perceive and interpret prosody is critical for successful communication. Prosody is in the scope of practice of SLPs, therefore it is important that the SLPs are encouraged in their efforts to provide such services, and have available resources to do so in a successful way.

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Appendix A
Survey Instructions

For this survey, you will answer questions about your training, knowledge, and practices in the domains of literacy and prosody. Your responses will be anonymous and confidential. You can skip any questions that you do not feel comfortable answering. The survey should take 15-20 minutes of your time.

As a thank-you for your participation, you can enter your email address into a raffle for a $50 Amazon or Walmart gift card. If you would like to enter the raffle, you will be able to do so at the end of the survey. We will not be able to link your email address with your responses on the survey.

Appendix B
Questions relating to participant characteristics

Question		Response Options
What is your gender?		Male; Female; Prefer not to answer
What is your race or ethnicity? Select all that apply.		Caucasian; Black or African America; Asian; Hispanic or Latino; American Indian or Alaskan Native; Native Hawaiian or Other Pacific Islander; Other (please specify); Prefer not to answer
If applicable, which years did you complete the following degrees?	B.A. or B.Sc.	*Fill in the blank*
	M.A. or M.S.	*Fill in the blank*
	Ed.D. or Ph.D.	*Fill in the blank*
In which state did you complete your highest degree in speech-language pathology?		*Drop-down menu with all states*
What type of licensure do you currently hold?		CCC-SLP; Clinical Fellowship Year-in progress; SLP-A or similar; Other (please explain)
If applicable, in what state(s) do you currently hold licensure?		*Drop-down menu with all states*
What is/are your primary work settings? Select all that apply.		Early Intervention Program; Preschool; Elementary school; Middle school/junior high; High school; University; Private Practice; Hospital; Nursing Facility; N/A; Other (please specify)
How many years have you been in your current position?		*Drop down menu*
How many years have you spent working in a school setting? If you have not worked in a school setting, you can leave this question blank.		*Fill in the blank*
If you are currently or have every working in a school setting, what percent of your assessment and therapy time was spent in the following locations? If you have never worked in a school you can leave this question blank.	Classroom with other students present	*Fill in the blank*
	Group assessments or therapy in a private or semi-private room	
	Individual assessments or therapy in a private or semi-private room	
	Other (please explain)	
How many clients do you have on your caseload each month?		*Fill in the blank*
How much professional experience do you have working with the following?	Autism Spectrum Disorder	*7 point scale:* • 0= No experience • 4= Some experience • 7= A lot of experience
	William's Syndrome	
	Down Syndrome	
	Specific Language Impairment	
	Developmental Apraxia of Speech	
	Acquired Apraxia	
	Aprosodia or Dysprosodia	
	Ataxia	
	Dysarthria	
	Auditory Processing Disorder	
	Hearing impairment with cochlear implant	
	Hearing impairment without cochlear implant	
	Dyslexia	
	Alexia	
	Hyperlexia	
	Dysgraphia	
	Non-native speakers for accent reduction	

Appendix C
Questions relating to knowledge of prosody and its disorders, training in prosodic disorders, and assessment and treatment of prosodic disorders

Question		Response Option
Have you gained knowledge about prosody development, assessment, and/or treatment through any of the following forms of education? Select all that apply.		Prosody was addressed in graduate course(s); prosody was a primary focus of at least one graduate course; Clinical clock hours/clinical practicum experiences during graduate school; Training in prosody during Clinical Fellowship Year, Continuing Education Units, Seminars/webinars/conferences (not for CEUs); Textbooks; Journal articles; Collaboration with other SLPs; Collaboration with researchers or academics; Experience with clients after receiving CCCs; Other (please describe)
Indicate your level of agreement with the following statements.	Statement	*7 point scale:* • 0= No experience • 4= Some experience • 7= A lot of experience
	My training on prosody and prosody development was adequate.	
	My training about assessing and diagnosing prosodic impairments was adequate.	
	My training on treating prosodic impairments was adequate.	
	More coursework should be devoted to prosodic development, assessment, and treatment at the graduate level.	
	There are sufficient Continuing Education Units available to SLPs related to prosody.	
For how many clients on your current caseload do you notice or suspect problems with prosody?		*Fill in the blank*
Is the current number of clients with prosody impairments or differences typical for you caseload?		Yes; No, I typically have more clients with prosodic impairments or differences than I do now; No, I typically have less clients with prosodic impairments or differences than I do now
Approximately how many of your clients in the last year were referred to you, in part, because of difficulties with prosody?		*Fill in the blank*
Which of the following skills have you notice or suspected problems with for your clients with prosodic impairments? Select all that apply.		Conveying emotion through tone of voice; Producing speech with appropriate pitch variation (e.g., not monotone); Producing appropriate question versus statement intonation; Producing appropriate word-level stress; Producing appropriate sentence-level stress to convey emphasis or contrast; Producing speech with appropriate loudness; Understanding a speaker's emotion from their tone of voice; Understanding linguistic aspects of

		prosody, such as question versus statement intonation, word-level stress, or sentence level stress; Understanding other aspects of prosody; Other (please specify); Not applicable
What is the most common diagnosis for your clients who have prosodic impairments? If you do not have clients with noted prosodic impairments, you can leave this question blank.		*Fill in the blank*
What are the methods or procedures by which clients with prosodic impairments are referred to you? Select all that apply.		Screenings; Teacher referrals; Parental referrals; Doctor referrals; Referrals by outside agencies; Self-referrals; Other (please describe)
How often do you administer prosody assessments to clients who you suspect may have a prosodic impairment or difference?		Never; Rarely; Occasionally; Always
Have you ever administered any of the following prosody assessments? Select all that apply.		PEPS-C (Profiling Elements of Prosody in Speech-Communication) by Peppé and McCann, 2003; PVSP (Prosody Voice Screening Profile) by Shribery, Kwiatkowski, & Rasmussen, 1990; PROP (Prosody Profile) by Crystal, 1982; Informal prosody assessment developed by you or another professional; Other (please specify)
How often do you target prosody in therapy with clients who have prosodic impairments?		Not applicable; Never; Rarely; Occasionally; Always
How often do you target prosody with clients who are working on accent reduction?		Not applicable; Never; Rarely; Occasionally; Always
If applicable, please briefly describe the prosody interventions/therapies you have used.		*Fill in the blank*
Indicate your level of agreement with the following statements.	Statement	*7 point scale:* • 0= No experience • 4= Some experience • 7= A lot of experience
	If there were an easy-to-administer standardized assessment for prosody, I would use it as a part of a comprehensive assessment for some of my clients.	
	The prosody assessments that are available are adequate for my needs.	
	I do not have time to administer assessments of prosody.	
	If a client came to me with a prosodic impairment, I would know how to assess it.	
	If a client came to me with a prosodic impairment, I would know how to treat it.	
	If a client came to me with a prosodic difference due to a foreign accent, I would know how to target it.	
	I am just as comfortable assessing prosody as other aspects of speech, language, or literacy.	

	I am just as comfortable treating prosody as other aspects of speech, language, or literacy.	
Indicate your impression of the importance of prosodic difficulties in each of the following disorders or differences. If you do not have knowledge about prosody in a particular disorder, you may skip it.	Disorder or Difference	*7 point scale:* • 0= No experience • 4= Some experience • 7= A lot of experience
	Autism Spectrum Disorder	
	Williams Syndrome	
	Down Syndrome	
	Specific Language Impairment	
	Developmental Apraxia of Speech	
	Acquired Apraxia	
	Aprosodia or dysprosodia	
	Ataxia	
	Dysarthria	
	Auditory Processing Disorder	
	Hearing impairment with cochlear implants	
	Hearing impairment without cochlear implants	
	Differences due to foreign accent	
Indicate your level of agreement with the following statements.	Statement	*7 point scale:* • 0= No experience • 4= Some experience • 7= A lot of experience
	Assessing and treating prosodic impairments is part of the scope of practice of an SLP.	
	Prosody is usually a low priority when considering a client's speech and language needs as a whole.	
	Prosodic impairments impact a client's intelligibility.	
	Prosodic impairments impact a client's ability to express themselves.	
	Prosodic impairments impact other people's social perceptions of the client.	
	Prosodic differences due to foreign accent impact a client's intelligibility.	
	Prosodic differences due to foreign accent impact a client's ability to express themselves.	
	Prosodic differences due to foreign accent impact other people's social perceptions of the client.	
Do you feel you are currently lacking in your ability to work with clients who have prosodic impairments or differences? If yes, please indicate which areas you feel you are lacking in.		Knowledge of the nature of prosody and prosody development; Knowledge of assessment methods; Knowledge of treatment methods; Experience with clients with prosodic impairments; Other (please describe)

Appendix D
Responses to the question "If applicable, please briefly describe the prosody interventions/therapies you have used."

- I've used materials from various publishers and journal articles. One product that I've used with some clients (not as published, however) is the Prosody Treatment Program published by LinguiSystems.
- using song lyrics and hand gestures or line drawing to indicate when changes are needed
- selected activities from various sources, no specific intervention
- pacing boards as compensatory tool to comprehensibility/intelligibility
- Work on emphasizing which syllable or word to accent (comprehension and production); work on prosody of questions and exclamations (comprehension and production)
- Discuss voice and discrimination on different voicing
- tapping out for pacing, practice with sentences with commas, question marks, exclamation point. and using recordings to decipher the speakers prosody.
- "Contrast word/phrase/sentence work
- Auditory feedback/awareness"
- Ballard's approach and Nuefield materials.
- all informal
- oral reading questions vs. statements, oral reading sentences w/various words underlined to be stressed, emotionally charged role play situations, formulating sentences to describe emotional pictures
- PROMPT therapy
- Pacing and pacing board, volume control, accented syllables.
- Some fluency materials for kids involving sentence repetitions with visual supports, etc--nothing amazing; prosody is usually the least of their problems. However, with articulation students, I do try to model variations in prosody in sentence repetition tasks, and encourage them to imitate those variations especially if this is a problem area for the child. One of these students has started varying the prosody across his 10 repetitions of the sentence to convey slightly different ideas or purposes.
- workbook activities with visual cues, amplification for improving self-monitoring, modeling
- I base accent reduction on intonation patterns we use for questions vs. statements.
- singing, matching pitch
- Using correct tone, understanding others tone, question vs comment, sounding more natural, etc
- modeling, teaching meaning of punctuation, metalinguistic discussion
- Listening to recordings/videos
- No specific intervention or therapy, just work on identifying/using correct stress and inflection, as well as determining meaning from tone of voice.
- "We train teachers who are working with students that may speak other dialects
- of American English than Academic Business English so we are always looking at prosody. But it is done in a Language Wellness setting not a disorder orientation. "
- Teaching emotion and voice intonation through social context

- Using a white board (since no visi-pitch is available) to show proper vocal inflection for asking questions, etc.
- Increasing students' awareness through recordings of their voice; repeated readings; teaching phrasing; sequencing activities targeting smooth speech transitions between sequences; students interpretation of the meaning of the same statement read in different ways; retelling 3 bears with different voices for mama bear, papa bear and baby bear
- Modeling
- Typically addressed with children who have autism. Gets worked on indirected when we are working on asking questions and understanding and using emotions and facial expressions
- Sentence "tapping" - this is an informal technique I have used to use tactile feedback on the clients' hands
- pacing boards
- increased breath support for loudness of voice
- Beating out the rhythm, selecting the word in a sentence that should have stress, etc.
- I rarely if ever have to assess prosody- at times it is addressed with my little ones with DAS as they can sound more monotone.
- Experience based
- I work with very young children and if we are targeting this type of goal, it is typically to associate emotion with a speaker's words/expressions.
- Audio/Video recordings/playing for feedback, modeling for client-have them imitate
- Observation, recording, identifying errors with clients, recordings/feedback.
- I have targeted prosody features with fluency students mainly in the school settings. In my geriatric population caseload, usually it has already been diagnosed and I follow up with therapy interventions.
- I briefly provided direct services targeting prosody during my CFY in a SNF. The patient was diagnosed with Parkinson's Disease. We worked on volume control, stress patterns in sentences, and pauses when speaking.
- Pacing
- I've never had a student with prosody issues so it would be a whole new world to me.
- nothing formal, just modeling
- Incidental instruction, explicit teachings, models, role-plays, video modeling
- Syllable, word, and sentence stress, voice output meter, record voice and listen
- Social Language approaches, ECO Scales, video modeling, match, carrier phrases, sort/say, tape recording, inside voice, outside voice, pacing boards, finger tapping
- Pragmatic Speech Therapy